

## Central Valley Regional Water Quality Control Board

7 March 2013

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### RESPONSE TO COMMENTS, TENTATIVE WASTE DISCHARGE REQUIREMENTS (WDR); BIG OAK FLAT (GROVELAND) MUNICIPAL SOLID WASTE LANDFILL (MSWL); TUOLUMNE COUNTY COMMUNITY RESOURCES AGENCY (DISCHARGER); TUOLUMNE COUNTY (COUNTY)

Central Valley Regional Water Board (Regional Water Board) staff received your comments that were submitted on your behalf by RMC Geoscience, Inc. (Consultant) on 4 March 2013. Your comments are appreciated and upon careful consideration we have prepared the following responses to your comments:

#### 1. **FINDING 30 - PERCHED GROUNDWATER**

- a. *"Finding 30 in the AD WDRs states that previous site documents indicate perched groundwater may occur at the landfill and that perched groundwater may be present at the interface between weathered and unweathered bedrock. Based on this finding, the AD WDRs state that current wells do not monitor first encountered groundwater, and as a result, the AD WDRs require that a Work Plan be prepared that addresses monitoring of this interval. The basis for the AD WDR finding regarding perched groundwater is uncertain because the "previous site documents" are not referenced."*

**Response:** Previous site documents that discussed possible perched groundwater at the landfill are the Water Quality Solid Assessment Test Report (SWAT Report) dated September 1991, which stated that *"The upper 10 to 30 feet of weathered bedrock is considered more permeable than the underlying fresh bedrock and could result in seasonal perched ground water conditions."* Also, the Final Closure and Post Closure Maintenance Plan (JTD) dated October 2001 in Section 1.2.6 (Hydrogeologic Conditions) makes reference to perched ground water conditions by stating the following, *"As summarized in Section 1.2.5, the Big Oak Flat Landfill is underlain by a thin soil veneer and about 10 to 30 feet of weathered bedrock. The weathered bedrock, in turn, is underlain by relatively fresh and unweathered rock. Based on site monitoring results, groundwater occurs at depths ranging from 25 to 82 feet at the landfill. Because the upper weathered zone of bedrock is more permeable than the underlying rock, seasonal perched water conditions may occur at the landfill."* Accordingly, Finding 30 has been revised to identify the "previous site documents".

- b. *"However, the transition of weathered and unweathered bedrock is currently monitored at the site by four multi-interval landfill gas (LFG) probes.<sup>1</sup> Although these probes are designed to monitor LFG, they also effectively monitor the presence or absence of water because the monitoring protocol includes applying a vacuum to the probe. Because of the vacuum, water would be pulled to the monitoring instrument and would be immediately apparent if it were present. To the best of our knowledge this has never occurred, which strongly indicates that perched water is not present at this site. In the event water were detected, it would be possible to collect a sample from the probe. Because the probes are constructed in much the same manner as monitoring wells, the sample would be representative."*

**Response:** Email correspondence on 4 March 2013 and 5 March 2013, between the Discharger's consultant and Regional Water Board staff, concluded that the vacuum applied to the LFG probes is only capable of pulling water to a height of 70 inches (approximately 6 feet) which is less than the depth to the weathered-unweathered bedrock interface where the perch groundwater would be located. Therefore, Finding 30 has not been modified because the perched groundwater would not be pulled to the monitoring instrument as stated in the comment.

- c. *"The lack of transient or perched groundwater is consistent with site observations that show bedrock exposed at the ground surface is dense, indurated, and exhibits no discernible primary porosity. In this type of geologic environment, perched groundwater would not be expected and groundwater would be confined to widely spaced bedrock fractures. Drilling logs from the site monitoring wells and from 36 nearby domestic and public wells show that this is the case with first encountered groundwater ranging from 17 feet below the ground surface to 475 feet below the ground surface. Not one of the logs that were reviewed provides evidence of near-surface groundwater at the interface of weathered and unweathered bedrock nor does any log indicate the presence of perched groundwater. We request that this finding be revised to address the site-specific and surrounding area data and information."*

**Response:** The drill logs provided by the Department of Water Resources (DWR) to the Discharger's consultant on 28 January 2013 were prepared by water supply drilling firms. The intent of a detection monitoring well is different than the intent of water supply wells used for public or domestic water supply. In most instances, the drill logs identify first encountered groundwater that is capable of providing sufficient year-around drinking water supply. The drill logs provided by DWR do not have sufficient detail to identify whether moisture or oxidation was found at the weathered-unweathered interface. However, in the case of DWR Well Report No. 766409 the well completion report states that at 17 feet bgs, at the interface between the overburden and clay/decomposed granite (weathered material) and granite (unweathered material), the driller estimated a yield of 10 gpm. Furthermore, groundwater monitoring between weathered and unweathered bedrock was performed at Neilsen's Mini Mart at 17586 Highway 120, Big Oak Flat at groundwater monitoring well MW-5 at the interface between decomposed granite and bedrock. Also, shallow groundwater monitoring was performed at Vern's Groveland Chevron, another remediation site. Therefore, Regional Water Board staff finds that no revision to the existing finding is necessary based on this comment regarding addition of site-

specific and surrounding area data and information since the DWR data lacks sufficient detail to warrant such changes.

**2. FINDING 31 – SPRINGS GS-1 AND GS-2**

*"The AD WDRs indicates that spring GS-1 has not been monitored since 1990. This is not correct; GS-1 is sampled when water is present and was last sampled in December 2012. We request that this finding be revised to be factually correct."*

**Response:** Finding 31 has been clarified to indicate that monitoring of GS-2 has been discontinued and GS-1 continues to be monitored.

**3. FINDINGS 32 AND 34 – ELEVATION DISCREPANCY**

*"Findings 32 and 34 note a discrepancy between the reference elevations for the monitoring wells and the ground surface elevations shown on the site topographic map. Review of this information confirms the discrepancy and we believe it may have occurred at some time in the past when surveyed spot elevations from an unknown datum were converted during preparation of the site map. It should be noted, however, that the depth to groundwater, relative elevation changes between wells, calculated groundwater gradients, and reported flow directions in the site monitoring reports are accurate if the reference elevations for the different wells remain constant (i.e., the ground surface elevation is irrelevant to this calculation). The identified discrepancy will be resolved as part of the surveying required as part of the AD WDRs."*

**Response:** Comment noted.

**4. FINDINGS 42 AND 43 – MONITORING WELL GMW-3**

a. *"With respect to monitoring well GMW-3, Finding 42 states:*

*'A sanitary seal was placed from the surface to a depth of 30 feet bgs and the casing was perforated between 60 and 100 feet bgs to allow for shallow groundwater monitoring of zones of saturation, zones of perched water, and areas of highest hydraulic conductivity per Title 27 Section 20415(b)(B)(3 thru 5).'*

*We are unaware of any site reference that documents the reason for perforating the casing at this depth was "to allow for shallow groundwater monitoring of zones of saturation, zones of perched water, and areas of highest hydraulic conductivity per Title 27 Section 20415(b)(B)(3 thru 5)." In fact, the Amended Report of Waste Discharge (ROWD) that was submitted to the RWQCB in July, 2012 specifically states "The reason for perforating the casing at this depth is not known" (emphasis added). Moreover, the boring log for GMW-3 specifically states "no H<sub>2</sub>O" at 60 feet below the ground surface and shows that "minor H<sub>2</sub>O" was not encountered until 170 feet below the ground surface. As a result, there is no hydrogeologic reason to provide a screen at this depth. We request that the RWQCB provide its basis for the finding and/or to revise the finding to be factually correct."*

**Response:** Perforations were installed between 60 to 100 feet bgs and it can be concluded the reason for the perforations is allow the passage of groundwater. Also, the record shows that in 2005 during the rehabilitation of GMW-3 that bentonite seals were placed at 20 to 25 feet bgs and 100 to 104 feet bgs, between the original 8-inch borehole and the 2-inch casing. The reason for placing bentonite seals in an annulus is to prevent mixture of liquid between different zones along a well casing. The evidence supports the finding that the perforations were placed to allow for transmission of liquid into the monitoring well. Therefore, Board staff made no changes to the Finding.

b. *"Finding 43 states:*

*'During rehabilitation the well screen previously placed at 60 to 100 bgs depth was omitted.'*

*This is not correct. The well screen is still in place although a bentonite plug was placed below this zone. The presence or absence of a well screen at 60 to 100 feet below the ground surface is not significant nor would it serve any purpose because the first encountered groundwater occurs at a depth of 170 feet in this well. We request that this finding be revised to be factually correct."*

**Response:** The finding has been revised to indicate that GMW-3 is no longer screened at 60 to 100 feet bgs.

**5. FINDING 59 – WELL REHABILITATION AND VOC DETECTIONS**

a. *"Finding 59 states:*

*'Following the rehabilitation of GMW-2 and GMW-3 the Discharger in its quarterly monitoring reports noticed significant improvement in groundwater quality as many VOCs previously detected in trace values were now undetectable. Furthermore, VOCs reported above the PQL were now only detected intermittently as trace values.'*

*This statement is factually incorrect; to the best of our knowledge no monitoring report ever indirectly or directly related the improvements in groundwater quality at the site to the rehabilitation work on wells GMW-2 and GMW-3. This is because site data show a significant improvement in groundwater quality in GMW-2 before closure of the landfill in 2003 and before rehabilitation of the wells in 2005. Moreover, as described in more detail below and shown in Figure 1, wells GMW-2 and GMW-3 monitor the same fracture zones both before and after well rehabilitation."*

**Response:** Board staff disagrees with the Discharger's interpretation of the monitoring results. Staff has analyzed the historical monitoring data for 1,1-dichloroethane at GMW-2 and GMW-3. Regarding water quality improvements at GMW-2 prior to rehabilitation of the wells, Board staff concurs that significant improvements in groundwater quality occurred prior to the closure in 2003. Furthermore, the final closure cover over the unlined landfill constituted the corrective action in response to reported discharges of VOCs to groundwater. Following installation of the final closure cover, no significant reduction in concentrations of 1,1-

dichloroethane at GMW-2 was reported until after the Discharger rehabilitated the wells and switched over to a low flow sampling procedure. This was done without Board concurrence and without providing staff a report to evaluate whether or not the changes that were made had any impact on monitoring results. Regarding GMW-3 the historical data clearly shows a drastic decrease in concentrations of 1,1-dichloroethane at GMW-3 following the well rehabilitation and switching over to a low flow sampling procedure. The data also demonstrates that the period between installation of the final cover and rehabilitation of GMW-3 there was no significant downward trend in concentrations of 1,1-dichloroethane at GMW-3. However following rehabilitation of GMW-3 and implementation of low flow sampling procedures there was a significant decrease in concentrations of 1,1-dichloroethane at GMW-3. This trend difference in the monitoring data results indicate an anomaly at the time GMW-3 was modified. Finally, the Discharger's assertion that the monitoring system at GMW-2 and GMW-3 essentially remained the same before and after the rehabilitation of the wells is factually incorrect for the following reasons:

1. GMW-2 changed from an open bore monitoring well to a 2-inch cased well with screens placed at three discrete locations. Bentonite seals were placed between those discrete locations to prevent migration of water between zones.
2. GMW-2 changed its sampling procedure from high flow to low flow sampling.
3. GMW-2 changed the location of the pump from 250 feet bgs to 45 feet bgs.
4. GMW-3 is no longer screened at 60 to 100 feet bgs.
5. GMW-3 changed from an open bore monitoring well to a 2-inch cased well with screens placed at two discrete locations with bentonite seals placed between these screen intervals to prevent migration of water between them.
6. GMW-3 changed its sampling procedure from high flow to low flow sampling.
7. GMW-3 changed the location of the pump from 225 feet bgs to 170 feet bgs.

The Finding 59 remains unchanged except that instead of implying that the Discharger "*noticed*" significant improvement the finding will state that the Discharger "*reported*" significant improvement. Also, the reporting of significant improvement in groundwater quality was the basis for the Discharger's request on 30 March 2011 to reduce monitoring frequency which was granted on that basis (See Finding 60).

- b. Therefore, the data show no correlation between groundwater quality in these wells and the well rehabilitation work and we request that this finding be revised accordingly. The AD Information Sheet that is associated with the AD WDRs should also be revised in the same manner.*

**Response:** Regional Water Board staff disagrees that there is no correlation between groundwater quality and well rehabilitation work. A trend analysis of historical monitoring data at GMW-2 and GMW-3 before and after rehabilitation of the wells and implementation of low flow sampling procedures clearly indicates a discontinuity in downward trends at the time that changes were made. Other tests such as a non-parametric analysis of variance (rank sum) and Welch's T-Test on data before and after changes were made to well configuration and sampling procedures also indicates that those changes impacted the monitoring results. Therefore, Board staff made no changes to the Finding.

## **6. FINDINGS 61 THROUGH 67 – COMPLIANCE WITH TITLE 27 REQUIREMENTS**

*"These findings indicate that the existing monitoring system does not meet CCR Title 27 requirements because: (i) unauthorized changes were made to site monitoring wells GMW-2 and GMW-3; and (ii) monitoring wells GMW-2 and GMW-3 do not comply with California Department of Water Resources (DWR) well standards. With respect to these findings, we note:*

- a. **Changes to Monitoring Wells GMW-2 and GMW-3.** Finding 26 of the current WDRs (R5-2002-0142) for the landfill state: "The Discharger's detection monitoring program for groundwater at this Unit does satisfy the requirements contained in Title 27." Since the WDRs were issued in 2002, the only substantive changes at the landfill have included the completion of closure, the installation of the LFG monitoring probes, and rehabilitation work to mitigate caving in the formerly open borehole wells GMW-2 and GMW-3. The AD WDRs indicate that the monitoring program no longer meets the CCR Title 27 requirements because wells GMW-2 and GMW-3 were rehabilitated in 2005. However, as shown in Figure 1, the rehabilitated wells monitor the same water-bearing fractures that were monitored prior to the well maintenance work and site analytical data show no meaningful changes in groundwater quality were associated with the rehabilitation work. As a result, a determination that the well rehabilitation work by itself invalidates the previous WDR finding that the monitoring network complies with CCR Title 27 requirements is not supported by site information."

**Response:** See responses to Finding 59.

- b. **"DWR Water Well Standards.** Prior to rehabilitation, wells GMW-2 and GMW-3 were open boreholes that captured groundwater from two (GMW-3) and three (GMW-2) subsurface fractures. In our opinion, this type of monitoring system is appropriate for the site because: (i) a water table aquifer does not exist at the site; (ii) the fracture zones that are monitored are not separate aquifers, aquitards, or aquicludes [rather, they represent water-bearing void space within a surrounding matrix of intact rock with apparent negligible primary porosity]; and (iii) the fractures that are monitored occur within the uppermost water-bearing geologic unit and each fracture in each well occurs within the same geologic unit and rock type. The DWR Water Well Standards allow exemptions due to site-specific conditions and we therefore presume that the RWQCB relied on the aforementioned site-specific conditions and this exemption in making its earlier determination that the monitoring network met CCR Title 27 requirements. Because the wells capture groundwater from the same water-bearing fractures as was captured prior to rehabilitation, the RWQCB findings implication that the wells no longer meet CCR Title 27 requirements or DWR requirements due to the rehabilitation work is not supported by the site data.

We request that Findings 61 through 67 be revised to be factually correct and to specifically address the differences that lead to a finding of compliance with CCR Title 27 requirements in the current WDRs to a finding of non-compliance in the AD WDRs."

**Response:** See responses to Finding 59.

**7. PROVISION 8 – GROUNDWATER AND SURFACE WATER MONITORING WORK PLAN**

*"With respect to the Groundwater and Surface Water Monitoring Network Work Plan (Work Plan) required under this Provision, we note:*

- a. *"Provision 8a.1. If necessary based on RWQCB response to the preceding comments, the Work Plan will describe how wells GMW-2 and GMW-3 will be modified to only capture groundwater from the uppermost water-bearing fracture in each well."*

**Response:** Board staff disagrees with limiting the monitoring to only the "uppermost water-bearing fracture in each well." Due to the nature of fractured bedrock there is no assurance that only monitoring one water-bearing fracture zone provides adequate detection monitoring capable of detecting a release at the earliest time possible. Therefore, Board staff finds that no revision to the existing provision is necessary.

- b. *"Provision 8a.2. As described previously, there is no evidence that first encountered groundwater occurs 10 to 15 feet below the ground surface at the transition of unweathered to weathered bedrock. However, the site monitoring system currently includes LFG probes that monitor this interval around the entire perimeter of the landfill and these probes can be used to conclusively identify the presence or absence of groundwater. Accordingly, we suggest that the Work Plan address how these probes will be used as groundwater monitoring points to collect samples for analysis in the event groundwater is detected."*

**Response:** See response to finding 30.b. The Discharger can propose using the LFG probes if it is technically feasible and provides a reasonable assurance as to the absence or presence of groundwater at the transition of unweathered to weathered bedrock.

- c. *"Provision 8a.3. The Work Plan will include an evaluation of well GMW-2 with respect to point of compliance and the potential for storm water influence on groundwater quality. In the event the results of this evaluation indicate the potential for storm water influence, the Work Plan will include an assessment of mitigation measures such as lining the detention pond as alternatives to moving the monitoring well."*

**Response:** The provision has been changed to allow for other alternatives such as, but not limited to, lining the detention pond.

- d. *"Provision 8a.4. The Work Plan will identify all springs that discharge within one mile of the facility based on review of available records, site reconnaissance/mapping, and review of remote sensing imagery. If any springs are identified that potentially could be affected by the landfill, the Work Plan will contain a proposal for their subsequent monitoring. The springs will be located on the site map addressed under Provision 8e."*

**Response:** Regional Water Board staff does not agree to limiting the survey of springs to a documentation review exercise. The Discharger will have to perform a physical survey of the surrounding area at a time when seasonal springs are most apparent.

- e. *"Provisions 8a.5. The Work Plan will evaluate the effectiveness of surface water monitoring points LJC-1 and LJC-2. Alternative monitoring points will be proposed if it is determined that their locations do not comply with CCR Title 27."*

**Response:** Comment noted.

- f. *"Provision 8e. The site topographic survey required under this provision will reconcile the topographic map and monitoring well reference point discrepancies and will clearly identify the datum of the map. Any springs identified as part of the spring survey will be shown on the map. The map will be prepared and stamped by a California Licensed land surveyor."*

**Response:** Comment noted.

If you have any questions, please call me at (916) 464-4815 or contact me via email at [vkjain@waterboards.ca.gov](mailto:vkjain@waterboards.ca.gov).



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